R E M A R K S

Status of the Claims

Claims 1-9 are pending in this application. No claims have been canceled, added or amended. Applicants submit the following remarks and Declaration under 37 CFR 1.132 in support of the allowability of the claims.

Rejection under 35 USC 103(a)

The Examiner rejects claims 1-9 as obvious over Maeda et al. WO 99/01507 (WO '507) in view of Shiobara et al. USP 5,225,484 (Shiobara '484). Applicants traverse the rejection and respectfully request the withdrawal thereof.

Applicants submit that the present claims are patentable over the combination of WO '507 and Shiobara '484 because Applicants' invention provides unexpected superior properties over any allegedly suggested combination of WO '507 and Shiobara '484. Applicants do not concede that the Examiner has established a *prima facie* case of obviousness.

The present invention is directed to a semiconductor encapsulating flame retardant epoxy resin composition comprising an epoxy resin, a phenolic resin curing agent, zinc molybdate supported on an inorganic carrier, an inorganic filler and

block copolymer (D-iii) obtained by reacting an epoxy resin or an alkenyl group bearing epoxy resin with an organopolysiloxane of formula (2) as recited in claim 1, in combination with zinc molybdate supported on an inorganic carrier are effectively molded and cured into products, which have an excellent fire retardance, moisture resistance, and solder cracking resistance despite the absence of halogenated epoxy resins and antimony compounds, such as antimony trioxide.

Component (D-iii) of the present invention is used in combination with the molybdenum compound, especially zinc molybdate, whereby the formation of a silicon carbide (Si-C) coating is promoted to enhance flame retardance. The block copolymer (D-iii) has an epoxy resin structure as well as an organopolysiloxane structure in the molecule, thus, it can be microscopically dispersed in a resin matrix of the epoxy resin and the phenolic resin curing agent to form an island-in-sea structure, which contributes to a further improvement in flame retardance. This feature is demonstrated in the Declaration of Mr. Asano submitted under 37 CFR § 1.132, which is enclosed herewith.

WO '507 discloses an epoxy resin composition for encapsulating semiconductors that have excellent flame retardation, high temperature storability and water resistance. This composition comprises an epoxy resin, curing agent, curing

accelerator, inorganic filler and zinc molybdate. (Please note that zinc molybdate is an indispensable component.) WO '507 fails to disclose component (D) of the present invention. Particularly, WO '507 fails to disclose or suggest the use of zinc molybdate in combination of an epoxy-modified silicone resin. Accordingly, WO '507 corresponds to Comparative Examples 1 and 6 in the present specification.

Applicants submit that Shiobara '484 discloses an epoxy resin composition comprising an epoxy-silicone resin copolymer, which is a reaction product obtained by an addition reaction between an alkenyl group-containing epoxy resin and an organopolysiloxane of formula (2): $H_aR_bSiO_{(4-a-b)/2}$, wherein R is a substituted or unsubstituted monovalent hydrocarbon group, a is a number from 0.01 to 0.1, b is a number from 1.8 to 2.2, and $1.8 < a+b < 2.3$, the number of silicon atoms per molecule is an integer from 20 to 500, and the number of hydrogen atoms directly attached to silicon atoms is an integer from 1 to 5.

Applicants submit that Shiobara '484 only describes that the epoxy-silicon resin copolymer (epoxy-modified silicone resin) is used as a low stress-imparting agent. Shiobara '484 fails to disclose and teach the flame retardant effect that the epoxy-silicone resin copolymer has on the composition.

Accordingly, it is not expected from Shiobara '484 that an epoxy resin composition in which an epoxy-modified silicone resin is used in combination with zinc molybdate and which is free of harmful halogenated epoxy resins and antimony compounds, can be effectively molded and cured into a product having improved solder crack resistance, flame retardance and reliability.

In Shiobara '484, all of the examples use a brominated epoxy resin. Accordingly, it is quite difficult to find out the semiconductor encapsulating epoxy resin compositions of the invention which are effectively molded and cured into products which have excellent fire retardance, moisture resistance and solder cracking resistance despite the absence of halogenated epoxy resins and antimony compounds (e.g., antimony trioxide).

On the other hand, in the enclosed Declaration, it is clear that the claimed composition yields excellent features that are not realized by the combination of cited art.

In the Declaration, Comparisons 3 to 5 use XF-40, TSF-410 and XF-42, respectively, which are all disclosed in Fujieda JP 06-080861 A. Comparison 6 uses TREFIL E-500@ which is disclosed in Kitahara, JP 05-331263. The above references were cited during prosecution of the original application. It should be

noted that not only the epoxy-modified silicone resin but also dimethylsilicone oil (Polyorganosiloxane A), methylphenyl-silicone oil (Polyorganosiloxane C), alcohol-modified silicone oil (Polyorganosiloxane E), higher fatty acid-modified silicone oil (epoxy-modified silicone oil) as well as spherical silicone rubber particles are all used as a low stress-imparting agent.

Please note that Comparison 1 corresponds to Example 1 of the specification and Comparison 2 corresponds to Example 3 of the specification.

As is evident from the results of the Declaration, the use of an alcohol-modified silicone oil, a higher fatty acid-modified silicone oil and an epoxy-modified silicone oil, as well as, the use of silicone rubber particles, all used in Shiobara '484, would be inferior to the present invention in one or more properties such as moldability, flame retardance, moisture resistance and solder cracking resistance.

On the other hand, only the use of the epoxy-modified silicone resin as used in the present invention can impart excellent moisture resistance and solder cracking resistance, even if the test conditions become more severe (leaving time 800 hours for moisture resistance and temperature 240°C for solder cracking resistance) with excellent moldability and flame retardance. Yet, the use of dimethylsilicone oil and methylphenylsilicone oil (Comparisons 1 and 2) would result in

inferior moisture resistance and solder cracking resistance when the test conditions become more severe.

As such, Applicants submit that the superior properties of the present invention as compared to Comparisons 1 to 6 as demonstrated by the attached Declaration cannot be expected from Shiobara '484. Thus, this rejection should be withdrawn as Applicants have proven secondary indicia of nonobviousness, namely unexpected superior properties, over the cited art.

Conclusion

As Applicants have addressed and overcome all rejections in the Office Action, Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Kecia Reynolds (Reg. No. 47,021) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Declaration under 37 C.F.R. § 1.132
of Eiichi ASANO